

REMARKS

This is a divisional application of USSN 09/442,000, which has been allowed. Claims 1 to 31 are pending in this application. Claims 1, 2, 4, 5 and 16 were amended and claims 20 to 31 were added.

Support for the amendment to claim 1 can be found throughout the specification especially the Examples where the reaction promoter is different than the solvent and the compound of Formula II. The amendment to claim 5 was to delete redundant solvent compounds and was not meant as limiting amendments. The amendment to claim 4 was to clarifying that the epoxy is an epoxy compound and not a group. This is not a narrowing amendment, but merely clarifying and redefining that the applicant is claiming epoxy compounds and not epoxy groups. Support for this amendment is shown on page 23, lines 27 to 30 where epoxy compounds are disclosed. Support for new claims 20 to 31 can be found in original claims 1 to 19 and page 27, lines 35 to 36.

The rejection of claims 5 and 16 under 35 U.S.C. 112, second paragraph is hereby moot based on the amendments to the claims whereby the redundant solvents and term "including" were deleted.

The rejection of claims 1 to 19 under 35 U.S.C. 103(a) as being obvious under U.S. Patent No. 1,551,095 to Fritzsche et al. (Fritzsche) is respectfully traversed.

The above claims recite a process synthesizing a triazine compound of Formula III utilizing reactants, a Lewis acid, a reaction promoter and a solvent. A reaction facilitator is a mixture comprising the Lewis acid and the reaction promoter. The present inventors have discovered that by using a combination of at least one reaction promoter, at least one Lewis Acid and a least one solvent, that the reaction of a cyanuric halide with substituted or unsubstituted aromatic compounds can prepare intermediate 2-halo-4,6-bisaryl-1,3,5-triazine compounds in higher yields and with higher selectivity. The intermediate 2-halo-4,6-bisaryl-1,3,5-triazine compound may then be used to produce the compound of Formula I recited in the specification.

Claims 1 to 19 of the present invention can be distinguished from the cited patent because Fritzsche does not disclose or teach all the recited elements in the claims. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03 citing *In re Royka*, 490 F.2d 981, 180 U.S.P.Q 580 (CCPA 1974). Specifically, Fritzsche does not disclose or suggest the combination of a Lewis acid, a reaction promoter and a solvent in the same reaction. The reaction of Example 1 in Fritzsche, cited in the Office Action, contains a Lewis acid, but does not contain a reaction promoter. Likewise, the reaction in Example 2 contains a compound, which could act as a reaction promoter, but does not contain a Lewis acid. (In addition,

Examples 1 & 2 do not contain a solvent, which is a required element in claims 1 to 19.) Similarly, Example 3 cited by the Office Action contains a Lewis Acid and tetrachlorethane as a indifferent diluent (see col. 1, line 35 to 38), but does not contain a reaction promoter. The Office Action contends that the tetrachlorethane in Example 3 can be both a reaction promoter and a solvent. However, according to the plain meaning of the proviso in claim 1, one compound can not act simultaneously as both a reaction promoter and solvent in a given reaction.

In addition, Applicants also respectfully submit that the Office Action has not made a proper *prima facie* case for obviousness because in order to establish a proper rejection under 35 U.S.C. 103, the prior art itself must suggest the modification or provide the reason or motivation for making such modification. *In re Laskowski*, 871 F2d 115, 117, 10 U.S.P.Q.2d 1397, 1398-99 (Fed. Cir. 1989). The Office Action contends that it would have been obvious to combine the Lewis Acid in Example 1 of the Fritzsche patent with sulfuric acid in Example 2. However, merely because both compounds are disclosed in the application in separate reactions does not mean that one would be motivated to used both compounds in one reaction. "It is axiomatic that a claimed invention is not obvious solely because it is composed of elements that are all individually found in the prior art." *Life Technologies Inc., v. Clonitech Laboratories Inc.*, 56 USPQ2d 1186, 1190 (Fed. Cir. 2000). There must be some suggestion or motivation in the cited patent to combine these compounds in one reaction. Applicants respectfully submit that the Office Action is using impermissible hindsight reconstruction because the only suggestion or teaching to combine a Lewis Acid and a reaction promoter with a solvent in one reaction is Applicant's own invention.

In fact, the disclosures in Examples 1 and 2 of Fritzsche actually teach away from the instant invention. The disclosure in Example 1 states that the reaction sets in immediately and after a short time a solid mass is obtained (see col. 2, lines 84 to 88). One skilled in the art would not be motivated to add the sulfuric acid in Example 2 to accelerate the reaction in Example 1, as suggested by the Office Action, since the reaction sets in immediately. To the contrary, one skilled in the art is actually taught away from adding the sulfuric acid because why would one accelerate a reaction that sets in immediately.

Moreover, the products in Examples 1 and 2 are symmetrical tris-aryl triazines, while the instant invention relates to an asymmetrical 2-halo-4,6-bisaryl-1,3,5-triazine intermediates. The rejection failed to take the proper consideration of the unexpected result of the claimed combination of the reaction promoter and Lewis Acid. For example, the results in Example 7 of the present invention demonstrate that the addition of a reaction promoter greatly increases yield and selectivity to the 2-halo-4,6-bisaryl-1,3,5-triazine compounds of formula III. Other examples also support this result. A greater than expected

result is a pertinent factor to the legal conclusion of obviousness. *In re Corkill*, 226 U.S.P.Q. 1005 (Fed. Cir. 1985).

The above-discussion demonstrates the deficiencies in the 35 U.S.C. 103 prima facie rejection since the rejection fails to consider applicants' invention as a whole. *In re Jones & Hardy*, 727 F2d 1524, 1530, 220 U.S.P.Q. 1021, 1026, (Fed. Cir. 1983). The rejection fails to include consideration of the unexpected properties of the claimed composition. *In re Dillon*, 919 F2d 688, 692-693, 16 U.S.P.Q.2d 1897, 1901 (Fed. Cir. (en banc), cert. denied, 500 US 904 (1991)); *In re Huellmantel*, 324 F2d 998, 139 U.S.P.Q. 496, 498-499 (CCPA 1963). There is nothing in the cited reference to teach or suggest that the combination of the reaction promoter, Lewis Acid and solvent recited in claims 1 to 19 would greatly increase yield and selectivity to the 2-halo-4,6-bisaryl-1,3,5-triazine compounds. Based on the discussion above, the 103(a) rejection under Fritzsche should be withdrawn.

It should be noted that new independent claim 20 should also not be rejected as being anticipated or rendered obvious by Fritzsche. Claim 20 is similar to claim 1 with the major exceptions being that the solvent is not required and that the reaction promoter is present in an amount of from about 0.01 to about 5 molar equivalents to cyanuric halide used in the reaction to form the compound of formula III. Giving the claim its broadest scope, i.e., where there is no solvent, it is clear that none of the Examples cited by the office Action contains all the required elements in new Claim 20. Again, Example 1 does not have the reaction promoter and Example 2 does not have the Lewis Acid. In Example, 3, the tetrachlorethane is being used as a indifferent diluent (see col. 1, line 35 to 38 in Fritzsche). Moreover, the amount of tetrachlorethane added in Example 3 is outside the range recited in Claim 20 (i.e., 18.5 parts of cyanuric chloride is 0.1 mole while 200 parts tetrachlorethane is about 1.2 moles, i.e., a 12:1 molar ratio). Therefore, since Fritzsche neither discloses nor teaches all of the required elements in Claim 20, a 102(b)/103(a) rejection should not be issued against this new claim.

The rejection of claims 1 to 15 under 35 U.S.C. 103(a) as being obvious under U.S. Patent No. 3,118,887 to Hardy et al. (Hardy) in view of U.S. Patent No. 1,551,095 to Fritzsche et al. (Fritzsche) is respectfully traversed. The present invention utilizes Friedel-Crafts chemistry with a reaction promoter to produce an intermediate asymmetrical 2-halo-4,6-bisaryl-1,3,5-triazine compounds with high yield and high selectivity. Hardy discloses the preparation of asymmetrical triazines by reacting cyanuric halide with one or two molecular proportions of an aromatic compound to yield intermediates, then treating the intermediate compounds with one or two molecular proportions of another aromatic compound to yield a second intermediate, and finally treating the second intermediate with a third aromatic compound to yield the asymmetrical product. (See Hardy, col. 3, lines 1-9). However, the examples disclosed in Hardy which use Friedel-Crafts chemistry all relate to the preparation

of symmetrical triazine products, (see Examples 2, 4, 8, 11 and 12), as cited by the Examiner. The examples disclosed in Hardy which lead to the production of asymmetrical triazines involve different chemical techniques, such as the use of Grignard reagent (Example 16), or reaction of species other than a cyanuric halide (Examples 5, 6, 7, 13 and 14) in a first step, followed by a Friedel-Crafts reaction in a second step. Hardy contains no example that teaches the use of Friedel-Crafts chemistry alone for the preparation of asymmetrical triazines intermediates from cyanuric halide. Therefore, one skilled in the art would not have been motivated by Hardy to produce the asymmetrical intermediate triazine compounds of the present invention utilizing Freidel-Crafts chemistry.

Furthermore, the Office Action acknowledges that Hardy does not disclose or teach the use of reaction promoters. The Office Action attempts to remedy this lack of disclosure or suggestion by using Fritzsche. However, as discussed above, there is no teaching or suggestion in either Hardy or Fritzsche to use the combination of a reaction promoter, a Lewis Acid and a solvent in one reaction. In fact, Fritzsche actually teaches away from such a combination as discussed above. The only disclosure and suggestion to make such a combination is Applicants' own invention, which is impermissible hindsight.

Moreover, as discussed above, neither Hardy nor Fritzsche disclose that the combination of a reaction promoter, a Lewis acid and a solvent produces asymmetrical 2-halo-4,6-bisaryl-1,3,5-triazine compounds with high yield and high selectivity. A rejection is erroneous where there is a lack of any suggestion or motivation in the prior art to combine the specific components as combined by the inventor so as to obtain the enhanced properties of the invention. *In re Newell*, 13 U.S.P.Q.2d 1248 (Fed. Cir. 1989). The prior art must contain both the suggestion of the combination and the expectation of the source in obtaining the results desired. This must be in the prior art, not in applicant's disclosure. *In re Dow Chemical Co.*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988). Since neither Hardy nor Fritzsche teach or even hint at this favorable result, the 103(a) rejection should be withdrawn.

Again, it should be noted that new independent claim 20 should not be considered obvious under Hardy in view of Fritzsche. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03 citing *In re Royka*, 490 F.2d 981, 180 U.S.P.Q 580 (CCPA 1974). Neither Fritzsche nor Hardy teach or disclose all the claim limitations in claim 20. Specifically, none of the compounds that fall within the definition of reaction promoters are within the molar equivalent range recited in the claims. Therefore, since neither Hardy nor Fritzsche alone or together disclose or teach all of the required elements in Claim 20, a 103(a) rejection should not be issued against this new claim and its dependent claims.

Accordingly, it is believed that the pending claims 1 to 31 are in condition for allowance and an early notification of such allowance would be appreciated.

If any outstanding issues remain, the Examiner is invited to telephone the undersigned at the number indicated below. Please charge the fee for the extra claims added by this Amendment to deposit account 03-4083.

Respectfully submitted

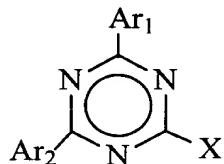


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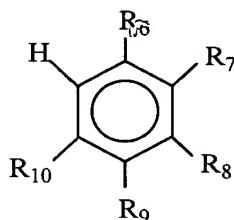
EXHIBIT A
Changes to the Claims

1. (amended) A process for synthesizing a triazine compound of Formula III:



Formula III

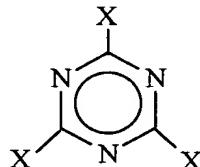
wherein X is a halogen and Ar₁ and Ar₂ are the same or different and each is a radical of a compound of Formula II:



Formula II

wherein R₆, R₇, R₈, R₉, and R₁₀ are the same or different and each is hydrogen, halogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, aracyl of 6 to 24 carbon atoms, OR, NRR', CONRR', OCOR, CN, SR, SO₂R, SO₃H, SO₃M, wherein M is an alkali metal, R and R' are the same or different and each is hydrogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, cycloalkyl of 1 to 24 carbon atoms, cycloacyl of 5 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, or aracyl of 6 to 24 carbon atoms, and optionally with either of R₆ and R₇, R₇ and R₈, R₈ and R₉, or R₉ and R₁₀, taken together being a part of a saturated or unsaturated fused carbocyclic ring optionally containing O, N, or S atoms in the ring, which comprises:

reacting a cyanuric halide of the Formula V:



Formula V

wherein each X is independently a halide selected from the group consisting of fluorine, chlorine, bromine and iodine, with at least one compound of Formula II with the reaction being conducted in the presence of at least one solvent and a reaction facilitator comprising sufficient amounts of at least one Lewis acid and at least one reaction promoter for a sufficient time at a suitable temperature and pressure, optionally in the presence of at least one solvent, to produce a triazine compound of Formula III, with the proviso that the reaction promoter is different than the solvent and the compound of Formula II.

2. (amended) The process according to claim 1, wherein the Lewis acid is aluminum halide, boron halide, tin halide, zinc halide, lead halide, ~~manganese halide~~, magnesium halide, copper halide, titanium halide, alkyl aluminum halide, gallium halide, iron halide, arsenic halide, antimony halide, or a mixture thereof.

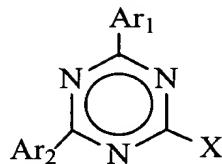
4. (amended) The process according to claim 1, wherein the reaction promoter is an acid, base, water, alcohol, aliphatic halide, halide salt, acid halide, halogen, alkene, alkyne, ester, anhydride, carbonate, urethane, carbonyl, epoxy compound, ether or acetal compound or a mixture thereof.

5. (amended) The process according to claim 1, wherein the solvent is heptane, carbon disulfide, cyclohexane, chlorobenzene, dichlorobenzene, trichlorobenzene, bromobenzene, dibromobenzene, tribromobenzene, toluene, xylene, trimethylbenzene, nitrobenzene, dinitrobenzene, anisole, nitroalkanes, heptane, ~~cyclohexane~~, benzene, ~~nitrobenzene, dinitrobenzene, toluene, xylene, 1,1,2,2-tetrachloroethane, dichloromethane, dichloroethane, ether, dioxane, tetrahydrofuran, benzonitriles, dimethylsulfoxide, tetramethylene sulfone, carbon disulfide, and benzene rings substituted with at least one halide including chlorobenzene, dichlorobenzene, trichlorobenzene, fluorebenzene, difluorebenzene, trifluorebenzene, bromobenzene, dibromobenzene, tribromobenzene, or mixtures thereof.~~

16. (amended) The process according to claim 15, wherein the protic acid contains at least one acidic functional group selected from the group consisting of: including RCO₂H, RSO₃H, RSO₂H, RSH, ROH, RPO₃H, RPO₂H, wherein R is hydrogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, cycloalkyl of 1 to 24 carbon atoms, cycloacyl of 5 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, or aracyl of 6 to 24 carbons atoms.

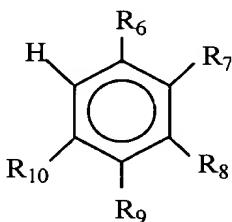
Please add new claims 20 to 31 as set forth below:

20. (new) A process for synthesizing a triazine compound of Formula III:



Formula III

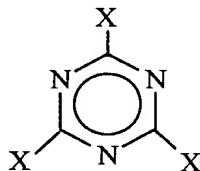
wherein X is a halogen and Ar₁ and Ar₂ are the same or different and each is a radical of a compound of Formula II:



Formula II

wherein R₆, R₇, R₈, R₉, and R₁₀ are the same or different and each is hydrogen, halogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, aracyl of 6 to 24 carbon atoms, OR, NRR', CONRR', OCOR, CN, SR, SO₂R, SO₃H, SO₃M, wherein M is an alkali metal, R and R' are the same or different and each is hydrogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, cycloalkyl of 1 to 24 carbon atoms, cycloacyl of 5 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, or aracyl of 6 to 24 carbon atoms, and optionally with either of R₆ and R₇, R₇ and R₈, R₈ and R₉, or R₉ and R₁₀, taken together being a part of a saturated or unsaturated fused carbocyclic ring optionally containing O, N, or S atoms in the ring, which comprises:

reacting a cyanuric halide of the Formula V:



Formula V

wherein each X is independently a halide selected from the group consisting of fluorine, chlorine, bromine and iodine, with at least one compound of Formula II with the reaction being conducted in the presence of a reaction facilitator comprising sufficient amounts of at least one Lewis acid and at least one reaction promoter present in an amount of about 0.01

to 5 mol equivalents to the cyanuric halide of Formula V, with the proviso that the reaction promoter is different than the compound of Formula II.

21. (new) The process according to claim 20, wherein the Lewis acid is aluminum halide, boron halide, tin halide, zinc halide, lead halide, magnesium halide, copper halide, titanium halide, alkyl aluminum halide, gallium halide, iron halide, arsenic halide, antimony halide, or a mixture thereof.

22. (new) The process according to claim 20, wherein the Lewis acid catalyst is aluminum chloride, aluminum bromide, boron trifluoride, tin chloride, zinc chloride, titanium tetrachloride, or a mixture thereof.

23. (new) The process according to claim 20, wherein the reaction promoter is an acid, base, water, alcohol, aliphatic halide, halide salt, acid halide, halogen, alkene, alkyne, ester, anhydride, carbonate, urethane, carbonyl, epoxy compound, ether or acetal compound or a mixture thereof.

24. (new) The process of claim 20 further comprising a solvent.

25. (new) The process according to claim 24, wherein the solvent is heptane, carbon disulfide, cyclohexane, chlorobenzene, dichlorobenzene, trichlorobenzene, bromobenzene, dibromobenzene, tribromobenzene, toluene, xylene, trimethylbenzene, nitrobenzene, dinitrobenzene, anisole, nitroalkanes, heptane, benzene, 1,1,2,2-tetrachloroethane, dichloromethane, dichloroethane, ether, dioxane, tetrahydrofuran, benzonitriles, dimethylsulfoxide, tetramethylene sulfone or mixtures thereof.

26. (new) The process according to claim 21, wherein the Lewis acid is present in an amount of about 1 to about 10 mol equivalents to the cyanuric halide of Formula V.

27. (new) The process according to claim 23, wherein the reaction promoter is a protic acid.

28. (new) The process according to claim 27, wherein the protic acid contains at least one acidic functional group selected from the group consisting of: RCO_2H , RSO_3H , RSO_2H , RSH , ROH , RPO_3H , RPO_2H , wherein R is hydrogen, alkyl of 1 to 24 carbon atoms, haloalkyl of 1 to 24 carbon atoms, aryl of 6 to 24 carbon atoms, alkenyl of 2 to 24 carbon atoms, acyl of 1 to 24 carbon atoms, cycloalkyl of 1 to 24 carbon atoms, cycloacyl of 5 to 24 carbon atoms, aralkyl of 7 to 24 carbon atoms, or aracyl of 6 to 24 carbon atoms.

29. (new) The process according to claim 27, wherein the protic acid is HCl, HBr, HI, HNO₃, HNO₂, H₂S, H₂S0₄, H₃P0₄, H₂C0₃, acetic acid, formic acid, propionic acid, butanoic acid, benzoic acid, phthalic acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, methanesulfonic acid, p-toluenesulfonic acid, or mixtures thereof.

30. (new) The process according to claim 29, wherein the reaction promoter is water, acid, or a mixture thereof.

31. (new) The process according to claim 23, wherein the reaction promoter is an aliphatic halide.